AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Amendments shown by strikethrough (for deleted matter) or underlining (for added matter).

1. (currently amended) A microvalve for providing flow regulation suitable for use in a microsystem comprising;

a first substrate layer defining a first plane;

a second layer disposed over the first substrate layer cooperating with the first substrate layer to form a flow duct through which the flow traverses thereby defining a direction of main flow along a flow axis;

an obstruction element introducible in the flow duct ~~defined by the second layer~~ for obstructing the flow, said obstruction element being displaceable in a second plane substantially perpendicular to the direction of main flow and out of plane with respect to the first substrate layer; and actuator means operative on the obstruction element for controllably displacing the obstruction element to regulate the flow.

2. (cancelled)

3. (previously amended) The microvalve according to any one of claim 1 wherein, the external actuator means is attached to the obstruction element operative for controllably displacing the obstruction element to regulate the flow.

4. (previously amended) The microvalve according to claim 1 wherein, the actuator means is a thermal bimorph actuator comprising materials with different thermal expansion coefficients such as aluminum bonded together with the material from the second layer, wherein a controllable temperature change causes the bimorph actuator to bend due to the difference in thermal coefficients of expansion between the materials.

5. (cancelled)

6. (currently amended)The microvalve according to claim 1 wherein, the microvalves ~~are~~ is actuated using piezoelectric actuation means.

7. (currently amended)The microvalve according to claim 1 wherein, the microvalves ~~are~~ is actuated using magnetic means.

8. (currently amended)The microvalve according to claim 1 wherein, the microvalves ~~are~~ is actuated using electrostatic means.

9. (previously amended) The microvalve according to claim 1 wherein, the microvalves are actuated using thermal actuation means such as monomorph expansion, shape memory, or thermopneumatic means.

10. (previously amended) The microvalve according to claim 1 wherein, the obstruction element is displaced to obstruct the flow in a frictionless "free-hanging" manner in order to avoid tribological effects during operation.

11. (original) The microvalve according to claim 10 wherein, the "free-hanging" obstruction element, when in a closed position, is laterally moved a small distance in a direction substantially parallel to the direction of the direction of the flow against a jam formed from the second layer to reduce or block off any leakage flow.

12. (cancelled)

13. (previously amended) The microvalve according to claim 1 wherein, said second layer mainly comprises silicon material into which the microvalve structures and features are machined into a silicon wafer using bulk micromachining or surface micromachining.

14. (original) The microvalve according to claim 13 wherein, the microvalve structures are microfabricated using Deep Reactive Ion Etching (DRIE).

15. (cancelled)

16. (cancelled)

17. (cancelled)

18. (cancelled)

19. (cancelled)

20. (cancelled)

21. (cancelled)

22. (cancelled)

23. (cancelled)

24. (currently amended)A method of operating a microvalve to provide flow regulation of a fluid comprising a first substrate layer, a second layer disposed over the first substrate layer cooperating with the first substrate layer to form a channel through which a flow traverses and defining a direction of flow along a flow axis, an obstruction element introducable in the flow duct ~~defined by the second layer~~ for obstructing the flow, and actuator means attached to the obstruction element for displacing the obstruction element, the method comprising the step of displacing the obstruction element along a plane substantially perpendicular to the direction of the flow and out of plane with respect to the first substrate layer.

25. (original) The method according to claim 24 wherein, the displacement of the obstruction element is produced by a thermal actuation means, magnetic means, piezoelectric means or electrostatic means.

26. (original) The method according to claim 24 wherein, the obstruction element can be actuated and displaced in opposite directions in response to a control signal such that the microvalve can be actively opened or closed by heating up the actuator means.